Macronutrient composition determines accumulation of persistent organic pollutants from dietary exposure in adipose tissue of mice - DTU Orbit (08/11/2017)

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Accumulation of persistent organic pollutants (POPs) has been linked to adipose tissue expansion. As different nutrients modulate adipose tissue development, we investigated the influence of dietary composition on POP accumulation, obesity development and related disorders. Lifespan was determined in mice fed fish-oil-based high fat diets during a long-term feeding trial and accumulation of POPs was measured after 3, 6 and 18months of feeding. Further, we performed dose-response experiments using four abundant POPs found in marine sources, PCB-153, PCB-138, PCB-118 and pp'-DDE as single congeners or as mixtures in combination with different diets: one low fat diet and two high fat diets with different protein:sucrose ratios. We measured accumulation of POPs in adipose tissue and liver and determined obesity development, glucose tolerance, insulin sensitivity and hepatic expression of genes involved in metabolism of xenobiotics. Compared with mice fed diets with a low protein:sucrose ratio, mice fed diets with a high protein:sucrose ratio had significantly lower total burden of POPs in adipose tissue, were protected from obesity development and exhibited enhanced hepatic expression of genes involved in metabolism and elimination of xenobiotics. Exposure to POPs, either as single compounds or mixtures, had no effect on obesity development, glucose tolerance or insulin sensitivity. In conclusion, this study demonstrates that the dietary composition of macronutrients profoundly modulates POP accumulation in adipose tissues adding an additional parameter to be included in future studies. Our results indicate that alterations in macronutrient composition might be an additional route for reducing total body burden of POPs.

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